OBSERVATIONS ON THE LEARNING OF VISION, AFTER A SUCCESSFUL OPERATION, AT THE AGE OF SIX YEARS, IN A CONGENITALLY BLIND PATIENT.

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By J. Herbert Fisher.

For an analogous case the reader is referred to a paper by Augstein—Klin. Monatsbl.f.Augenh., Vol.. LI., ii, p. 521, 1913.

As Augstein's paper was reviewed in the April number of the *Ophthalmic Review*, it seems appropriate to supplement it by a case of similar character, which has been in my hands, though the facts are perhaps of greater interest to the psychologist than to the ophthalmic surgeon.

As I am not competent to discuss it from the psychological aspect, I prefer to confine myself to a brief statement of facts, hoping that they may be of some interest, and perhaps of value, in regard to the psychology of vision.

L. L. was a little girl in her seventh year, brought to me at St. Thomas's Hospital in the early part of the present year. The child had always been quite healthy, but her mother recognised that she was very defective in sight by the time she was six weeks of age. It was stated that two years ago she was at an eye hospital for a period of two months, but the treatment adopted there had been of no practical value in providing her with sight. Since that date she had been attending a blind school of the L.C.C. Any sight that the child possessed when I first saw her resided in the right eye, but even in this eye there was practically no reflex to be obtained from the fundus; the pupil was blocked with membrane, and dilated imperfectly, with one large posterior synechia, and the vision was not better than the barest hand shadows. In the left eye there was a dense

cataract and some thickening of the lens capsule; no red reflex was obtainable, the pupil was active, and dilated circularly on using a mydriatic; perception of light with this eye was good. There was no history of defective sight in the family. I decided to operate upon the left eye, and on the 21st January, 1914, the child being under a general anæsthetic, I proceeded to needle the lens. Immediately a considerable quantity of milky fluid lens material came forward into the anterior chamber; in the centre of the lens there was a fairly large semi-solid portion. Making an incision, I was able to evacuate practically the whole of the lens matter; some of the lens capsule presented in the wound, was picked up with forceps and cut off with iris scissors. A good red reflex could at once be obtained through the pupil. The eye was kept under atropin, and no unfavourable reaction followed the operation. Three days after the operation, on first testing vision—but without correction of the focus,—the child was quite unable to identify any object by the sense of sight, but on calling other senses to her aid she recognised objects promptly and reliably. A week after the operation, on using the opthalmoscope, a healthy disc and a perfectly natural fundus were easily seen. Rough correction of her refraction was adjusted; and further tests applied. By the sense of sight a penny was not identified, but when it was placed in her hands she was at once able to name it. A small book with a leather cover conveyed nothing through the eyes, but the child called it " leather " when placed in her hands, and, on further handling, identified it as a " book." An ordinary wooden match-box was called a " box " by the sense of touch, and named as a " match-box " when the contents were rattled in her hearing; similarly, a watch presented to her vision gave her obvious pleasure, but what it was was quite beyond her powers until it was put up to her ear, when she immediately called it a " clock." In the dark room she was shown a small medicine glass under

the illumination of two electric lights, but she was unable to name it until she handled it; this object I followed with a bright pair of scissors, and this was the only object she tried to name by the sense of sight, and she called it "glass," presumably due to the fact that its bright, reflecting surface recalled to her mind the glass which she had just seen; she knew the object as scissors at once when it was placed in her hand. A pocket-knife with metal handle she could not recognise by sight, and called it "iron" by the sense of touch. About a week later a similar series of tests was again employed under similar conditions in the dark room. It was interesting by now to watch the evident mental efforts which the child made to use her sense of sight, but the results were not very much better than on the previous occasion. The child was quite intelligent, and in the blind school her other senses had been well trained. On this occasion most of the same objects that I had previously employed were again tried, but with very little better result; but now, in her attempt to identify what was shown her, she called several bright objects "glass," including the scissors. She did not know a cake of soap, but identified it by the sense of smell. A reel of cotton was known by the touch only. I discovered on this occasion that she recognised colours with fair readiness; presumably she had sufficient sight in the right eye to appreciate bright colour, and I found that she had been taught them at school, as she said, "on toy animals." She was able to identify flowers and their colour by the unaided sense of sight. By the 18th February there was evidence that her powers of recognising objects by sight were decidedly improving; the spectacles provided for her, + 13·D spherical, were now in constant use, and she recognised a watch, also a book and some other objects, but she still made many mistakes unless allowed to use her other senses. Since that date I have seen her again on more than one occasion, and the training of her sight powers is progres-

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sive and satisfactory, but she still has much leeway to make up.

The above case corresponds closely with that of a child of about the same age described by Uhthoff. Her senses of hearing, smell, and touch had been turned to good account by the training of the blind school she had attended. The difficulties of orientation experienced by Augstein's patient were not a conspicuous feature of my case, but some allowance has to be made for the very shadowy vision of the right eye in this respect. My patient was at first unable by the sense of sight to guide the hand to grasp an object offered to her; she struck me as being rather reluctant to make the effort to do so; she may have been deterred by uncertainty whether a pleasant or other sensation would result from contact with the unknown object or by a feeling of incapacity to perform the act asked of her; I am unable to say. When she did make the effort her judgments of position and space were certainly very faulty, but, considering her age, perhaps not more faulty than would have been those of an ordinary cataract patient wearing correction for the first time.

I do not think there was any evidence in my patient to show that vision was at first of the tubular type and that peripheral vision was acquired later. The direct vision of Augstein's patient was ultimately 5/50; in my case there was no optical reason why 6/6 should not be obtained. My patient was young, but very willing, attentive, and interested in my investigations; it was not possible, at her age, to carry them as far as might have been wished. The very small amount of vision of the right eye—it was scarcely more than a bare perception of light vitiates the case to an infinitesimal degree; for all practical purposes the child was sightless, and behaved as such, before my operation. I found nothing to support Augstein's view that there are three stages in the recovery of vision, nor can I differentiate between education of the brain and education of the retina; I conceive that education both of

the end organ and of the centre go on progressively and simultaneously in such cases before the ultimate best use can be made of the new-found sense of sight.

THE SIMULTANEOUS CORRECTION OF HORIZONTAL AND VERTICAL DEVIATION, FACILITATED BY A SLIGHT MODIFICATION OF THE MADDOX ROD.

By Arthur J. Ballantyne, M.D.,
Surgeon to the Eye Infirmary, Glasgow.

When hyperphoria co-exists with exophoria or esophoria it is sometimes desirable to make a prismatic correction of both deviations. This may be done by placing before one eye a prism with its base up or down to correct the hyperphoria, and another prism with its base in or out before the other eye to correct the horizontal deviation. But a better method is to find the single prism which, set obliquely, will simultaneously correct both deviations. To do this we must first estimate separately the vertical and horizontal errors; and then calculate two quantities, namely, (1) the strength of the resultant prism, and, (2) the angle to which this prism must be rotated from the vertical in order to produce the desired effect. According to Maddox, the formulæ for these estimations are: for (1) $R = \sqrt{V^2 + H^2}$, and, for (2) $\text{Sin. } r = \frac{H}{R}$, R being the deviation of the resultant prism, V the vertical deviation, H the horizontal deviation, and r the angle of rotation of the prism from the vertical.

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